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COSMETICS APPLYING SYSTEM

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Abstract

Constitution

The system is composed of (A) a method for applying cosmetic compositions for coloring the skin or other parts of the body by electrostatic spraying and (B) an apparatus containing (i) a reservoir containing an electrostatically sprayable cosmetic composition for coloring, (ii) at least one delivery means connected to the reservoir, (iii) a high-voltage generator with an electric source as the power supply, and (iv) an adjusting means for selectively applying high voltage obtained from the generator to the delivery means or to each delivery means.

Effect

According to the direct applying system which utilizes the principle of electrostatic spraying, it is possible to delivery cosmetic compositions for coloring on the desired parts of the body such as the skin of the face, eyelids, eyelashes, nails, etc. The system is applicable to a well-known wide-range of cosmetics for coloring.

Claims

1. Method for applying compositions on the skin or other parts of the body that includes electrostatic spraying of a cosmetic composition for coloring the skin or other parts of the body.
2. Method described in Claim 1, characterized by (a) preparing an apparatus containing (i) a reservoir containing an electrostatically sprayable cosmetic composition for coloring, (ii) at least one delivery means connected to the reservoir, (iii) a high-voltage generator with an electric source as the power supply, and (iv) an adjusting means for selectively applying a high voltage obtained from the generator to the delivery means or to each delivery means, and (b) operating the adjusting means to electrostatically spray the cosmetic composition for coloring the skin or other parts of the body from the delivery means or from each delivery means.
3. Method described in Claim 1 or 2, characterized in that the cosmetic compositions for coloring are liquids.
4. Method described in Claim 1 or 2, characterized in that the cosmetic compositions for coloring are solids.

5. Method described in any of Claims 1-4, characterized in that the cosmetic compositions for coloring are either made of at least one cosmetic for coloring dissolved in solvents or carriers or contain at least one cosmetic for coloring dissolved in solvents or carriers.

6. Method described in any of Claims 1-5, characterized in that the application speed of the cosmetic compositions for coloring is 0.00001-0.1 mL/sec.

7. Method described in any of Claims 1-6, characterized in that the high-voltage generator generates 3-20 kV voltage.

8. Method described in any of Claims 1-7, characterized in that a number of cosmetic compositions for coloring are simultaneously or successively coated by the same or different delivery means of the apparatus.

9. Apparatus for applying cosmetic compositions for coloring the skin or other parts of the body, containing (a) a reservoir containing an electrostatic sprayable cosmetic composition for coloring, (b) at least one delivery means, (c) a high-voltage generator with an electric source as the power supply, (d) an adjusting means that selectively applies the high voltage obtained from the generator to the delivery means or to each delivery means to carry out electrostatic spraying of the cosmetic compositions from the delivery means or from each delivery means.

10. Apparatus described in Claim 9, characterized by further containing a supplying means between the reservoir and the delivery means or each delivery means.

11. Apparatus described in Claim 9 or 10, characterized in that the high-voltage generator generates 3-20 kV voltage.

12. Combined apparatus described in any of Claims 9-11 and electrostatically sprayable compositions comprising or containing at least one cosmetic for coloring.

13. An electrostatically sprayable composition comprising or containing at least one cosmetic for coloring.

14. Compositions described in Claim 13, characterized in that they are liquids.

15. Compositions described in Claim 13, characterized in that they are solids.

16. Compositions described in any of Claims 13-15, characterized in that their electrical resistivity is 10^4 - 10^{12} ohm•cm.

17. Compositions described in any of Claims 13-16, characterized in that at least one cosmetic is combined with at least one solvent or carrier.

18. Compositions described in any of Claims 13-17, characterized in that they are non-aqueous or essentially non-aqueous compositions.

19. Compositions described in any of Claims 13-18, characterized by further containing electrical resistivity-adjusting agents and/or viscosity-adjusting agents.

20. Compositions described in any of Claims 13-19, characterized in that the cosmetics for coloring include cosmetic foundation materials, cosmetics for packs, rouge, eyeshadow,

artificial suntanning materials, makeup materials, lip color and lip gloss, colored polymers and wax, eyeliner, mascara, nail color, nail enamel, nail varnish, hardening agents for nails, protective agents for nails, and a mixture of the above-mentioned substances.

21. Compositions described in any of Claims 13-20, characterized by further containing at least one auxiliary cosmetic or chemical selected from the group consisting of agents for local medical treatment, lip-protecting agents, agents for treatment of stained skin, skin-whitening agents, and agents for treatment of pigmentation disorders.

22. Use of electrostatically sprayable cosmetic compositions for color application on the skin or other parts of the body.

23. Use described in Claim 22, characterized by using the apparatus described in any one of Claims 9-11.

Detailed explanation of the invention

[0001]

Industrial application field

The present invention relates to a system for applying cosmetics, especially cosmetics for coloring the skin or other parts of the body. Particularly, the present invention relates to a method and an apparatus for applying a substance directly onto the skin of the face (or other parts of the face) and other parts of the body (such as nails).

[0002]

Prior art and problems to be solved by the invention

Conventional systems for beautifying the face, fingernails, toenails, and other parts of the body, especially the skin, or other treatments involve applying liquid, liquid-based or solid (such as powder) substances either by using brushes or by rubbing or direct applying with stick- or pencil-shaped materials. These well-known systems often depend on places, e.g., the system is limited to use in the bedroom or bathroom and is troublesome and difficult to adjust, inconvenient, and takes time. For example, a conventional method of applying rouge to one's cheeks using a soft brush takes time and it is difficult to color to the desired color level, especially when shading is required.

[0003]

By using oil-based carriers or excipient bases, most conventional cosmetics for coloring can be coated at a concentration suitable to obtain the desired cosmetic effect. Such oil-based carriers and other auxiliary substances are one cause of the problem of well-known applying

methods, and especially, it is troublesome when the users want to put on their makeup in various steps. In these well-known systems, the use of cosmetic raw materials is not economical.

[0004]

Furthermore, a problem which occurred in the method for applying well-known cosmetics for coloring is that when people want to apply multiple layers of such substances (such as in the makeup of the face), due to the use of a brush, puff, and direct-contact delivery means (such as sticks or pencils), it is often that the previously coated substances are disturbed and, as a result, if people want to sufficiently attain the desired cosmetic effect, considerable caution must be paid and time and application adjustment must be made.

[0005]

In such a direct-contact application method also, it is difficult to cover 100% of any specific area due to the contours and uneven tissue of the skin surface. As a result, cosmetics for coloring cannot be used effectively and the cosmetic coloring effect obtained cannot attain the desired optimal effect.

[0006]

In a certain considerably different technical field, the principle of electrostatic spraying of liquids and solids is also known. In this technique, the electric potential of the composition to be sprayed is increased in the spray nozzle and it is sprayed as a charged droplet. Such a charged droplet seeks the nearest grounded material and delivers its charge so that it can be used as the desired spraying target. Heretofore, electrostatic spraying methods were proposed mainly for a large-scale industrial and agricultural use, especially the delivery of reactive substances such as coating material, adhesive, and other surface applying and the delivery of insecticides and other large-scale agrochemicals. In this field, it is disclosed in, for example, GB-A-1393333, GB-A-1569707, GB-A-2092025, EP-A-029301, EP-A-253539, and WO-A-85/00761. Especially, as for the electrostatic spraying of coating materials and other pigments, the indications include EP-A-234841, EP-A-195546, GB-A-1478853, GB-A-1464370, GB-A-1461385, and GB-A-1364244.

[0007]

More recently, a few proposals were made for delivery specific substances other than those mentioned above using a well-known principle of electrostatic spraying.

[0008]

Instead of using conventional eye treatments such as eye lotions, the delivery of medically active agents to the eyes using an electrostatic sprayer was suggested in EP-A-224352.

[0009]

JP-A-56-97214 (1981) suggested applying granular (i.e., solid particles) coloring matter onto the hair using electrostatic spraying to carry out surface conditioning. However, the disclosed system was not suitable on a small scale for individuals; thus, it lacks appeal and applicability to important consumers.

[0010]

A tentative plan of the application of the principle of electrostatic spraying to coat a coloring matter onto fingernails was disclosed in FR-A-2415439 (January 1978). Its inventor suggested the use of electrostatic spraying as a means for applying fingernails using adhesive-varnish-pretreated small colored synthetic fibers. However, this earlier literature did not suggest how to actually deliver the fibers to the desired target and, furthermore, the disclosed system had almost no actual usefulness or applicability and appeal to the consumers.

[0011]

Thus the inventors of the present invention confirmed the above-mentioned problems of the known conventional technique, preconception, and limits, and as a result of understanding, from the results of many experiments, they devised a system which could deliver cosmetics for coloring by the effective use of the principle of electrostatic spraying and, as a result, they provided an apparatus and a method for application that were technologically effective and cost effective, and were safe and attractive and applicable to a wide range of consumers. Even if the system cannot solve all the problems of the preceding technology, it solves many of the problems or at least improves the problems.

[0012]

Means to solve the problems

Accordingly, in the first embodiment of the present invention, a method for applying cosmetic compositions for coloring the skin or other parts of the body is provided and the method includes electrostatic spraying of the composition onto the skin or other parts of the body.

[0013]

The method of the present invention preferably includes (a) preparation of an apparatus containing (i) a reservoir that contains an electrostatically sprayable cosmetic composition for coloring, (ii) at least one delivery means connected to the reservoir, (iii) a high-voltage generator with an electric source as the power supply, and (iv) an adjusting means for selectively applying the high voltage obtained from the generator to the delivery means or to each delivery means and (b) operating the adjusting means to carry out electrostatic spraying of the cosmetic composition onto the skin or other parts of the body from the delivery means or from each delivery means.

[0014]

In the second embodiment of the present invention, an apparatus is provided for applying cosmetic compositions for coloring the skin or other parts of the body. The apparatus contains (a) a reservoir containing an electrostatically sprayable cosmetic composition for coloring, (b) at least one delivery means connected to the reservoir, (c) a high-voltage generator with an electric source as the power supply, and (d) an adjusting means for selectively applying the high voltage obtained from the generator to the delivery means or to each delivery means to electrostatically spray the electrostatically sprayable cosmetic compositions for coloring from the delivery means or from each delivery means.

[0015]

In the third embodiment of the present invention, the combined apparatus defined above and electrostatically sprayable compositions comprising the cosmetics for coloring or containing the cosmetics for coloring are provided.

[0016]

The main modes of the present invention were described; however, a preferable embodiment and various optional characteristics will be explained in detail.

[0017]

A broad scope of materials can be given as examples for coatable cosmetics for coloring using the system of the present invention, and a single cosmetic or a combination of the cosmetics can be used. In the case of the latter, within the scope of the present invention, more than one cosmetic can be simultaneously or successively delivery from the same or different delivery means of the apparatus. This is especially useful in case it is necessary to considerably change the color or when it is especially necessary to adjust the color tone. In many cases, conventional cosmetics for coloring contain at least one auxiliary component, especially oil. This

helps the delivery and application control of coloring materials, but there is no direct relationship to the advantages from the viewpoint of the desired specific beauty culture. The specific advantage of the present invention is to eliminate at least some or essentially all of such auxiliary components from conventional cosmetic compositions containing "active" substances to be coated. However, within the scope of the present invention, if desired or if necessary, such auxiliary components may be used.

[0018]

Generally speaking, on the whole the necessary condition is that the cosmetic compositions are electrostatically sprayable.

[0019]

Usually as the need arises (to be further explained in the following), the main property of the electrostatically sprayable composition, which should be carefully selected or adjusted, is its electrical resistivity. The preferable electrical resistivity is approximately 10^4 to approximately 10^{12} ohm•cm, more preferably 10^6 to approximately 10^{10} ohm•cm. The use of electrical resistivity less than 10^4 ohm•cm is also possible. Electrical resistivity greater than approximately 10^{12} ohm•cm (such as up to approximately 10^{14} or greater) is also possible to use, but it is difficult to use a common inexpensive apparatus to measure electrical resistivity with such a magnitude. Electrical resistivity is measured generally at 25°C using a standard conventional apparatus and method.

[0020]

The compositions to be coated using the method of the present invention are preferably liquids, however, solid compositions also can be delivered according to the present invention. In case the cosmetic per se for coloring is liquid at room temperature, it can be delivered alone, or it may be combined with one or more auxiliary agents, and the auxiliary agents are also preferably liquid at room temperature. However, if a small amount is used, and the use does not eliminate the electrostatic sprayability, then, if desired, solids also may be used. In case the cosmetics for coloring are either usually solid at room temperature or have high viscosity, one or more solvents or carriers may be combined, and in this case, it may or may not contain other allowable auxiliary agents.

[0021]

Examples of especially preferable cosmetics for coloring that can be coated using the method and apparatus of the present invention are as follows:

[0022]

1. Cosmetic foundation materials such as creams or other compositions,
2. Cosmetics for packs,
3. Cosmetics for coloring of the skin such as rouge,
4. Cosmetics for eyes such as eyeshadow,
5. Artificial suntanning substances such as compositions containing dihydroxyacetone (DHA),
6. Makeup materials.

Further possible examples of cosmetics for coloring that are suitable to use in the present invention are as follows:

[0023]

7. Lip-coloring substances and lip gloss,
8. Colored polymers and waxes,
9. Cosmetics for eyes such as eyeliner and mascara,
10. Nail color, nail enamel, nail varnish, and hardening agents for nails and protecting agents for nails.

[0024]

There are many specific examples of substances that can be in the above-mentioned category and they are well known.

[0025]

In addition to the above-mentioned cosmetics for coloring, the compositions to be coated using the present invention may include at least one type of other "active" component with a secondary cosmetic effect or efficacy at the desired regions, and its examples include agents for topical treatment such as ethyl lactate and benzoyl peroxide, lip-protecting agents such as lip ointment, agents for treatment of dermal stains, whitening agents for the skin, and agents for treatment of pigmentation disorders such as freckles. By using such substances with cosmetics for coloring, it is useful in two ways and can provide an application system in which the main advantages of the application means can be expanded to the application substances having such an auxiliary cosmetic effect or efficacy; thus, it is advantageous.

[0026]

In the case of combination of the cosmetics for coloring to be coated with solvents or carriers, oil-based substances are preferable and, in this case, the cosmetics are preferably soluble in the solvents or carriers or are compatible with the solvents or carriers.

[0027]

Examples of suitable solvents, diluents, or carriers include silicone oil, oleic acid, hydrocarbons, isopropyl myristate, oleyl alcohol, oleate, squalene, sunflower oil, rapeseed oil, other vegetable oils, mineral oil, and alcohols or polyols (ethanol, isopropyl alcohol, propylene glycol, dipropylene glycol, phenylethyl alcohol, glycerol, 1,3-butanediol, 1,2-propanediol, isoprene glycol).

[0028]

In the case of using solvents, diluents, or carriers, the substances that do not chemically or physically interact with the surface (which does not have to be pretreated with another cosmetic) to be sprayed with cosmetic compositions for coloring are preferable. In case of spraying a surface pretreated with other cosmetics, cosmetic compositions for coloring that are insoluble in the pretreated surface layer or that do not interact with the surface layer are preferable. To improve the application and retention of the cosmetic compositions for coloring on the target surface, the solvents, diluents, or carriers are preferably volatile.

[0029]

The cosmetic compositions for coloring to be sprayed are preferably those that can wet the target surface (which may be or may not be pretreated with other cosmetics), and for this purpose one or more common surfactants may be added to the compositions to be sprayed. The suitable surfactants can be selected from the group consisting of anionic surfactants, cationic surfactants, amphoteric surfactants, and nonionic surfactants; their classification and examples are known to the expert in the field.

[0030]

The cosmetic compositions for coloring to be coated by the present invention are preferably nonaqueous or contain only a slight amount of water (such as less than 10 wt%, more preferably less than 5 wt% and most preferably less than 1 wt%). This is because the electrical resistivity of water is small so it is generally difficult to effectively spray aqueous compositions using electrostatic means.

[0031]

As mentioned above, depending on the cosmetic compositions or cosmetics, there are some cases in which it is necessary to add one or more substances for adjusting the electrical resistivity. The examples for such substances and the suitable amount to be used are known to the expert in the field or can be obtained from a simple experiment. One example of the suitable substance for adjusting the electrical resistivity is charged substances such as salts (e.g., sodium chloride or salts which are usually used in products for individuals or buffering agents for chemical compositions). Polar substances such as alcohols (e.g., ethanol) may also be used for lowering the electrical resistivity, and nonpolar substances (such as oil and other hydrophobic substances) may be used to increase the electrical resistivity.

[0032]

In addition to electrical resistivity, viscosity is another parameter of the compositions to be sprayed that needs to be selected or adjusted carefully.

[0033]

In the present invention, substances with a broad viscosity range are suitable. The suitable scope of the viscosity is approximately 0.1 to approximately 50,000 mPa, preferably approximately 0.1 to approximately 10,000 mPa, more preferably approximately 0.5 to approximately 5000 mPa (25°C). If desired or if necessary, one or more viscosity-adjusting agents may be added. Examples of such viscosity-adjusting agents include salts (such as alkali metal or ammonium halides), polymers and common thickeners, oils and polar oil-based thickeners (cosmetic oil, wax, glyceride, and suitable amphipathic substances having a melting point higher than 20°C).

[0034]

As is clear from several modes of the system of the present invention, if the viscosity is essentially inversely proportional to the flow rate of substances delivered from the delivery means, the viscosity can actually be used as a parameter for adjusting the rate of delivery of the cosmetics for coloring to the desired area. For example, it can assign the optimum delivery rate of the specific substance to be used according to the specified method and the constitution or demand of the user, and in this case, by careful selection of the viscosity of the composition, a self-adjusting applying mechanism can be obtained.

[0035]

In the present invention, any hardware, electrical constitutional elements, and circuits can be used as long as they have suitable constitution and design. There are many suitable conventional electrostatic spraying apparatuses that can be used in the present invention, and such apparatuses or specific properties of them with and without combination of the spraying system of the present invention can be used.

[0036]

In addition to the above-mentioned references, examples of references for suitable hardware for electrostatic spraying include GB-A-2061769, GB-A-2073052, EP-A-031649, EP-A-132062, EP-A-163390, EP-A-171184, EP-A-234842, EP-A-243031, EP-A-368494, EP-A-441501, EP-A-468735, and EP-A-468736.

[0037]

In the present invention, as can be understood by the expert in the field, the specific constitution and design of said apparatus and electrical and other operational parameters can be selected or adjusted according to the desired functional properties as can be designated by the composition or substance to be sprayed and/or the demand of the user.

[0038]

Thus the specific properties of the apparatus of the present invention that can be selected and/or adjusted include, for example, the voltage that can be obtained by the high-voltage generator and the electric source, delivery means of the substance or the magnitude of electric field in its domain, the flow rate of the substance to be sprayed from the reservoir to the delivery means and to its outside, the size and shape of the delivery means, and the constitution and properties of the substance-supplying mechanism used between the reservoir and the outlet of the delivery means.

[0039]

In the preferable embodiment of the present invention, the preferable voltage generated by the high-voltage generator from the electric source is approximately 2 to approximately 20 kV, more preferably approximately 2 to approximately 10 kV. The voltage most suitable to a certain fixed system depends on the substance to be sprayed and other parameters, and is adjusted in such a manner that the whole system becomes optimal.

[0040]

The magnitude of electric field that is the source of spraying action of the electrostatic apparatus depends considerably on the voltage applied. However, if necessary, the magnitude of the electric field can be adjusted, for example, by changing the shape of the nozzle and/or using an electric field-reinforcing electrode. These adjusting methods are well known from the literature cited above.

[0041]

Often the optimum flow rate of the substance to be sprayed depends on the composition of the substance per se, for example, the concentration of the "active" cosmetic component for coloring to be coated. As already mentioned with regard to the viscosity of the sprayable substance, the suitable flow rate can be selected according to the specified delivery method and/or the constitution or demand of the user. For example, according to the embodiment of the present invention, the preferable delivery rate of the composition is approximately 0.00001 to approximately 0.01 mL/sec, preferably approximately 0.0001 to approximately 0.001 mL/sec per delivery means. For some cosmetics for coloring, such as artificial suntanning agents, for which a relatively large amount is used, the preferable flow rate is larger than that mentioned above, such as up to approximately 0.05 mL/sec and can be up to approximately 0.1 mL/sec.

[0042]

The size and shape of one or more delivery means of the apparatus of the present invention can be any size and shape as long as they are suitable, and in this case also they can be so selected with other parameters that the electrostatic spraying system can function optimally. Generally speaking, the delivery means or each delivery means are of nozzle type and preferably made of insulating or semi-insulating materials such as plastics or various polymers, which are well known.

[0043]

The delivery means contain a measuring means and it is advantageous to equip it with a mechanism for adjusting the amount to be used for delivery the predetermined amount of substance from the nozzle or from each nozzle. Such means are useful, for example, if combined with a flow rate-adjusting system.

[0044]

In the preferable embodiment of the apparatus of the present invention, the delivery means or each delivery system is connected to the reservoir or a number of reservoirs (for

example, if one wants to spray more than one type of cosmetic for coloring from the same apparatus or same delivery means) by the substance-supplying means, namely, preferably fluid-communicated. As described in the preceding literature, such a supplying means may contain a wick (e.g., a porous wick), and the substance to be sprayed flows within and/or above it, and reaches the area with a high electric field, where the substance disperses as charged sprayed droplets or particles. The supplying means may also contain a hollow conduit and have the composition pass through it by capillary action. Also, in a system that needs an especially high flow rate, it may be equipped with a special supplying means such as a pump. This may be any type (e.g., electrically operable-type) as long as it is suitable; however, even a simple mechanical apparatus that can exert pressure to the reservoir containing the composition to be sprayed may do, thereby the composition inside the reservoir can be forced out to the delivery means.

[0045]

As is generally known, the apparatus of the present invention preferably contains a functioning machine (namely a manual adjusting means) for selective application of the high voltage obtained from the generator to the delivery means or to each delivery means to carry out the electrostatic spraying of the cosmetic composition for coloring onto desired parts, namely, the skin or other parts of the body. However, as can be understood by the expert in the field, for example, other suitable adjusting means that can automatically adjust the operation of the system may be used also.